REMARKS

Claims 1-27 are pending in this application.

Claims 1-27 are rejected.

The office action dated October 9, 2003 indicates that claims 1-3 and 26-27 are rejected under 35 USC §102(e) as being anticipated by Jonsson U.S. Patent No. 6,320,392; claims 1-27 are rejected under 35 USC §103 as being unpatentable over Moran U.S. Patent No. 5,321,598 in view of Jonsson and Kuroiwa et al. U.S. Patent No. 4,692,855; and claims 18-25 are rejected as being unpatentable over Esser et al. U.S. Patent No. 5,691,626 in view of Jonsson. These rejections are respectfully traversed.

'102 rejection over Jonsson

Claim 1 recites a power distribution system including an ac source connected to a power bus, a capacitor bank shunt-connected to the power bus, and an active filter shunt connected to a power bus. The active filter includes an inverter, an inverter control and current sensors. Each current sensor senses current flowing through a corresponding capacitor of the capacitor bank. In response to the current sensors, the inverter control causes the inverter to inject harmonic currents into the power bus.

Currents are sensed in the capacitor banks instead of the power line; therefore, the sensed currents are smaller than the currents in the power line. The sensing of lower currents allows for greater resolution of the harmonic currents. It also allows smaller current sensors to be used. Use of smaller current sensors can result in significant cost, size, and weight savings. Moreover, the harmonic currents are dealt with without cutting into the main distribution system. This last advantage is especially desirable for aircraft power distribution systems, where the main distribution current can be quite large.

Figure 1 of Jonsson discloses a supply line 1 connecting an electrical source 2 to a load 3. An active filter 4 is connected to the supply line 1. The active filter 4 includes a signal processor unit 5 and a power module 6. The signal processor unit 5 causes the power module 6 to inject compensation currents into the supply line.

At col. 3, line 65 to col. 4, line 2, Jonsson states "to determine ... the compensation current to be injected into the supply line by the power module, it is important to accurately monitor the supply line. The latter is performed by the signal processing unit."

Therefore, Jonsson does not teach or suggest sensing current through capacitors of a capacitor bank and, using the sensed current to control an inverter to inject harmonic currents into the supply line.

The office action cites the Abstract and Figures 3 and 7 of Jonsson, none of which support the '102 rejection. The Abstract states that response currents generated by the supply line are measured.

Figure 3 of Jonsson shows an output filter including capacitors C1, C2 and C3. These capacitors are not shunt connected to the power line. Figure 3 does not show current sensors that sense current flowing through the capacitor C1-C3. Figure 3 does not show an inverter control that, in response to the sensed currents, controls the inverter to inject harmonic currents into the supply line 1.

Figure 7 of Jonsson shows the active filter coupled to the supply line via a capacitor. The capacitor simply "takes care of the fundamental voltage" (col. 7, lines 28-30).

Thus Jonsson does not teach or suggest a power distribution system having all of the limitations of claim 1. Accordingly, claim 1 and its dependent claims 2-17 should be allowable over Jonsson alone.

Claim 26 recites measuring currents flowing through capacitors of a capacitor bank; and controlling an inverter to inject harmonic currents into a power bus in response to the measured currents so that the inverter supplies harmonic current demands of non linear loads on the power bus. Claim 26 and its dependent claim 27 should be allowable over Jonsson alone for reasons above.

'103 rejection over Esser and Jonsson

Claim 19 recites an active filter for a power distribution system. The system includes a power bus and a capacitor bank shunt-connected to the power bus. The filter comprises an inverter; and a plurality of control loops. Each control loop corresponds to a different multiple of capacitor bank Park Vector angle. Each control loop causes the inverter to inject a different harmonic current into the power bus.

As discussed above, Jonsson teaches the monitoring of the supply line, not capacitor bank currents. Thus, Jonsson does not teach or suggest a plurality of control loops, where each control loop corresponds to a different multiple of capacitor bank Park Vector angle. Esser et al. do not teach or suggest this limitation either. Therefore, claim 19 and its dependent claims 20-25 should be allowed over the combination of Esser et al. and Jonsson.

Claim 18 recites an active filter for a power distribution system. The filter comprises an inverter; means for generating a plurality of different voltage commands, each voltage command corresponding to a different harmonic current; means for summing the different voltage commands with a voltage command representing inverter voltage; and means, responsive to the summing means, for controlling the inverter to function as a current controlled-current source that

injects harmonic currents into a power bus such that the voltage on the power bus contains only a fundamental component.

Neither Esser et al. or Jonsson appears to disclose means for generating a plurality of different voltage commands, each voltage command corresponding to a different harmonic current; means for summing the different voltage commands with a voltage command representing inverter voltage. Therefore, the '103 rejection of claim 18 should be withdrawn. If this rejection is maintained in the next office action, the examiner is respectfully requested to identify these limitations by column and line number in Esser et al. and Jonsson.

'103 rejection over Moran, Jonsson and Kuroiwa et al.

The office action acknowledges that Moran does not show the control methodology of independent claims 1, 18, 19 and 26. As discussed above, the Jonsson patent doesn't either since it states "to determine ... the compensation current to be injected into the supply line by the power module, it is important to accurately monitor the supply line.

Kuroiwa et al. do not teach or suggest that such compensation currents can be determined by measuring currents flowing through capacitors of a capacitor bank.

Figure 1 of Kuroiwa shows an ac power supply including a dc power supply 1, a PWM control inverter 2 connected to the dc power supply 1, a smoothing reactor 3 connected to the output of the inverter 2, a capacitor 4 for absorbing higher harmonic current of the output of the inverter 2 (see the Abstract and col. 2, line 65 to col. 3, line 5). A sine wave signal corresponding to a current (Ic) flowing in the capacitor 4 is obtained as the output of the current transformer 13. Accordingly, the inverter 2 receives the sine wave control signal to operate so as to produce a sine wave output (col. 3, lines 16-20). Among the purported advantages of this system is that "it is easy to eliminate higher harmonics of frequency components, which are more than the switching frequency, of relatively high frequency by using a small-sized filter" (col. 6, lines 34-40).

Thus Kuroiwa et al. use a different methodology (filters) to deal with harmonic currents. Moreover, Kuroiwa et al. do not discuss the problems with sensing currents on a power bus or provide any other reason, motivation or incentive for using sensed currents in a capacitor bank to inject harmonic currents into the power bus such that the voltage on the power bus contains only a fundamental component.

Thus the combined teachings of Moran, Jonsson and Kuroiwa et al. do not produce the systems, filters and methods of claim 1-27. Therefore, claims 1-27 should be allowed over the combination of Moran, Jonsson and Kuroiwa et al.

Conclusion

The examiner is respectfully requested to withdraw the rejections of the claims and issue a notice of allowability. If any issues remain, the examiner is invited to contact the undersigned.